REMARKS

Status

This is in response to the Office Action dated 12/03/2003

The Office Action is responsive to a communication filed on 25 September 2003.

The Office Action is non-final.

Disposition of Claims

Claims 1-20 are pending in the application.

Of the above, claims 11-20 are withdrawn from consideration.

Claims 1-7 are rejected.

Claims 8-10 are objected to.

Preliminary Matters

Claims 11-20 were subject to restriction and/or election requirement, were not elected, were withdrawn from consideration, and are canceled herewith.

Claims 8-10 were objected to. Claim 8 is rewritten herewith. Claims 9 and 10 depend from claim 8, and need no amendment.

Substantive Grounds of Rejection

¶5. **Claims 1, 2** are rejected under 35 U.S.C. 103a as being unpatentable over Coretta (US 5,411,626).

¶6. **Claims 3, 4** are rejected under 35 U.S.C. 103a as being unpatentable over Coretta (US 5,411,626) in view of Kilborn (US 1,309,894) and/or Ostling (US 1,964,363).

¶7. **Claims 5, 6** are rejected under 35 U.S.C. 103a as being unpatentable over Coretta (US 5,411,626) in view of Kilborn (US 1,309,894) and/or Ostling (US 1,964,363), and further in view of Hineline (US 3,355,339) and Raynes (US 3,721,354).

¶8. **Claim 7** is rejected under 35 U.S.C. 103a as being unpatentable over Coretta (US 5,411,626) in view of Kilborn (US 1,309,894) and/or Ostling (US 1,964,363), and further in view of Hoehn (US 4,718,810).

Traversing the Rejection

As noted in the specification (page 2, line 15):

The present invention addresses the unique problems of alignment and registration which arise when the tire building drum is no longer fixed, but instead is a work-piece in a flexible manufacturing system (FMS) wherein the build drum is moved between automated work stations for application of successive component layers in successive work stations. The context of the present invention is an FMS having work-pieces (tire building drums) which are too large to allow the use of a precision pallet conveyor, so the tire building drums are moved (propelled) by other means which are not necessarily able, by themselves, to achieve sufficient accuracy in positioning the tire building drums relative to the work stations. The work stations each have a centerline, or "working axis" of the work station tire assembly devices (tools). Thus, one problem to be addressed is to precisely align the axis of the tire building drum with the working axis in each work station. Such alignment includes assuring that each point along the entire drum length of the tire building drum axis of revolution is within a specified precision distance of the work station working axis, i.e., alignment comprises making the tire building drum axis of revolution coincident with the work station working axis. A second problem, related to the first, is to precisely register the longitudinal position of the tire building drum relative to each work station. A solution to both problems provides three dimensional positioning of the tire building drum relative to the tools and devices of each work station with the desired degree of precision.

As further noted in the specification (page 9, line 28):

The AGVs 102 follow a path determined by a guide wire 104 embedded in the plant floor, shown in Figure 1A as an oval path passing through the work stations 110 from a first work station 110a to a last work station 110d, then looping back around to the first work station 110a. The work stations 110 are aligned to, and spaced along, a common, linear working axis 111, and the AGV guide wire 104 is approximately parallel to the working axis 111 where the guide wire 104 passes through the work stations 110. Also parallel to the working axis 111 and passing through the work stations 110 is a rail system 130 comprising a V-rail 131 (precisely parallel to the working axis 111), a flat rail 132 (approximately parallel to the working axis 111), a V-rail entry ramp 133, a V-rail exit ramp 135, a flat rail entry ramp 134, and a flat rail exit ramp 136. Each work station 110 comprises one or more application drums 112 (seven shown: 112a, 112b, 112c, 112d, 112e, 112f, 112g), one or more supply reels 113 (seven shown: 113a, 113b, 113c, 113d, 113e, 113f, 113g), and an intake server 114 (four shown: 114a, 114b, 114c, 114d). The application drums 112 are precisely aligned vertically and horizontally to the working axis 111, and are positioned longitudinally along the working axis 111 relative to a work station longitudinal reference point 115 (four shown: 115a, 115b, 115c, 115d) established for each work station 110, for example on a forward surface of the intake server 114.

As further noted in the specification (page 10, line 19):

The intake server 114a extends laterally (in the direction of the arrow 107) to a position behind the tire building drum 120a, couples to the tire building drum 120a while uncoupling the tire building drum 120a from the AGV 102a, and moves the tire building drum 120a into a precision longitudinal position by mating a drum reference

point 125 (as shown in **Figure 1C**) with the work station longitudinal reference point **115a**. Simultaneously, as will be described in detail hereinbelow, the tire building drum 120a is precisely aligned with the working axis 111 by the rail system 130, thereby providing precision placement in three dimensions of the tire building drum 120a relative to the application drums 112a, 112e of the first work station 110a.

As further noted in the specification (page 11, line 25):

> The tire building drum 120 is supported by a drum support frame 122 which in turn sits above the AGV 102. A portion of the rail system 130 comprising the V-rail 131 and the flat rail 132 is shown supporting and aligning the tire building drum 120 through skates (one flat skate 140 visible) attached to the bottom of the drum support frame 122, thereby precisely aligning the tire building drum 120 with the working axis 111, i.e., making an axis of rotation 121 (also see **Figure 1E**) of the tire building drum 120 precisely coincident with the working axis 111.

As further noted in the specification (page 12, line 7):

The drum reference point 125 is a rear-facing end surface of the tire building drum 120, but could be any fixed point on the tire building drum 120 or drum support frame 122. Because of the potential for "play" in the bearing connection between drum and frame, it is preferable to make the drum reference point 125 a rigid part of the tire building drum 120, such as shown, in order to achieve the best precision in longitudinal positioning of the tire building drum 120.

As further noted in the specification (page 13, line10):

> ... two pairs of properly positioned V-mounted bearing rollers 154 riding on a properly aligned V-rail 131 will provide alignment in the horizontal plane; that a single flat bearing roller 144 riding on a flat rail 132 positioned with the proper height will provide alignment in the vertical plane...

As further noted in the specification (page 15, line 30):

> **Figures 2C, 2E, 2F, and 2G** also illustrate side ramp features of the rail system 230 which provide **funneling** of skates 150, 450, 140, 340 entering the rail system 230. Since the V-skate 150, 450 provides precision lateral positioning when the V-mounted bearing roller pairs 154, 454 are riding on the V-rail 231, it is important to funnel in the V-skate 150, 450 as it enters the rail system 230 via the V-rail entry ramp 233.

As further noted in the specification (page 18, line 22):

> As described hereinabove, two alternative funneling methods may be employed according to the invention: a preferred method using side ramps 237 and 238a with corresponding side rollers 459 and 458, respectively; and an alternative method using side ramps 237 and 238b with corresponding side rollers 459 and 348, respectively.

Coretta (5,411,626) discloses a plant for for assembling elastomeric pneumatic tires having a plurality of assembling drums (2) moveable along a predetermined assembling path. Each drum encounters, according to a pre-established sequence, a number of primary work stations (10, 11, 12, 13) each intended for the application of a respective main component (4, 5, 6, 7) common to a

plurality of carcass types included in a predetermined production range. Alongside the primary stations are auxiliary work stations (14, 15) intended for applying specifically provided accessory components (8, 9), each being designed for a particular carcass type. Each auxiliary station can be removed and replaced by a different station depending on the type of process to be carried out and is movable between a rest position in which it is perpendicularly moved away from the assembling path and a work position in which it is operatively disposed along the assembling path, in order to execute the application of the respective accessory component. The primary work stations (10, 11, 12, 13) can be moved close to and apart from each other along the assembling path.

Alignment in 3 dimensions is an important part of the present invention. For example, as noted above, the application drums 112 are precisely aligned vertically and horizontally to the working axis 111, and are positioned longitudinally along the working axis 111 relative to a work station longitudinal reference point 115.

Regarding alignment, Coretta offers very little insight, for example:

> Preferably, the movement of the individual auxiliary work stations occurs following a secondary path which is generally perpendicular to said assembling path along which **the auxiliary work stations operate preferably in alignment with the primary work stations**, along a common work axis, advantageously the axis of rotation of the carcass being produced. The common work axis is preferably linear but may be curved or circular. (Coretta; column 2, lines 36-43)
>
> In the particular embodiment shown, all **stop positions are conveniently aligned along a common work axis** coincident with the axis of the carcass being manufactured. (Coretta; column 3, lines 55-58)
>
> In a novel manner, the auxiliary work stations 14, 15 are mounted on respective transverse slide guides 16, 17 and, upon command of known actuators (not shown), lend themselves to be individually displaced, preferably following a secondary path which is substantially perpendicular to the assembling path. The displacement of the individual auxiliary stations 14, 15 takes place between a rest position, in which said stations 14, 15 (as shown in FIG. 1) are moved away from the assembling path, in particular separated therefrom for possible interposition of primary stations 11, 12, and a work position in which they are located along the assembling path, being in **alignment with the primary work stations** 10, 11, 12, 13, and disposed operatively at one of said drum stop positions, in order to carry out the application of the corresponding accessory components 8, 9. (Coretta; column 4, lines 41-56)

Although Correta's work stations ***appear to be*** aligned (compare claim 2), Coretta does not disclose a rail system. (compare claims 3, 4, 5, 6, 7).

Kilborn (US 1,309,894) discloses a portable treading machine in connection with a series of aligned cores which are placed on tires. A trackway is provided to pass along the row of revolubly mounted cores. The treading machine may be rolled upon the trackway for movement into a position of operation before any of the cores. Basically, in Kilborn, the treading machine moves to

a series of cores. The whole operation seems to depend upon manual intervention (a crew of workmen, each ... may pass along the row of cores, in succession, each contributing toward the finishing of the tire carcass.)

Ostling (US 1,964,363) discloses an endless chain conveyor adapted to carry tire building drums and accessory mechanisms along a track and in continuous motion while operators apply material and perform certain manual duties thereon.

Hineline (US 3,355,339) discloses method and apparatus for making solid tires.

Raynes (US 3,721,354) discloses material handling system.

Hoehn (US 4,718,810) discloses high speed transporter.

Claim 4 is limited to both of the rails supporting and vertically aligning the tire building drums, while using only one of the rails for laterally aligning. This is related to the V-top shape set forth in **Claim 5**. From whence follows the flat rollers and V-mounted rollers of **Claim 7**.

Claim 4 is rewritten to be the main claim of the first set of claims (1-10).

Newly-presented claims, and claim count

Claims **1 and 3** are canceled. Claim 4 is now independent.

Claims **11-20** are canceled.

Newly-presented claims **21-24** depend from rewritten claim 8, and are comparable to claims 2, 4, 5 and 6.

Newly-presented claims **25-32** provide a different perspective on the invention, and are supported by the specification (as liberally quoted hereinabove), as well as by some of the pending claims.

After entry of this amendment, there remain:

20 total claims 2, 4-10, 21-24, 25-32

3 independent (1, 8, 25)

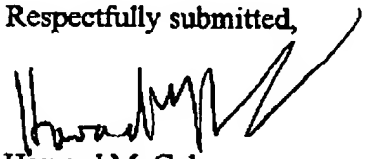
Conclusion

The claims should be allowed.

No new matter is entered by this Amendment.

Applicant has made a diligent effort to amend the claims of this application so that they define novel structure which is non-obvious. If there are still some issues to be resolved, the Examiner is invited to contact the undersigned.

Respectfully submitted,



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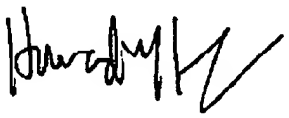
Signature : 

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